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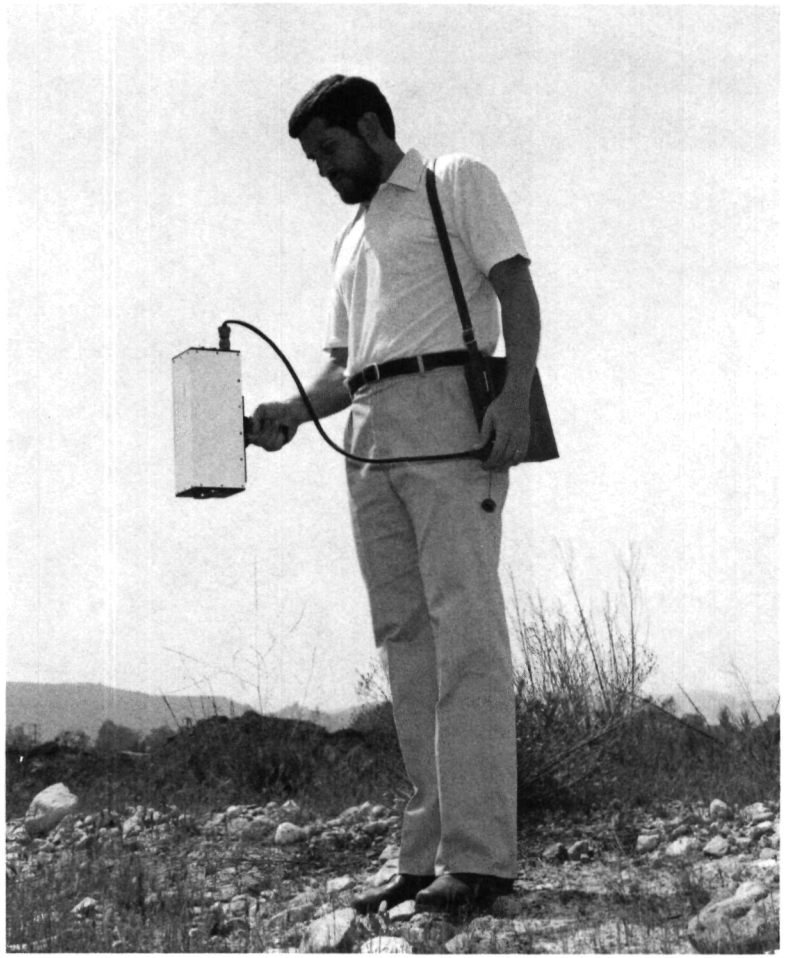
THE HAND-HELD RATIOING RADIOMETER

A new instrument has been developed at the Jet Propulsion Laboratory for use in identifying rocks and minerals in the field. The instrument, which simultaneously measures the surface radiance and displays the ratio, is an outgrowth of continuing research into remote-sensing methods for mineral and petroleum exploration.

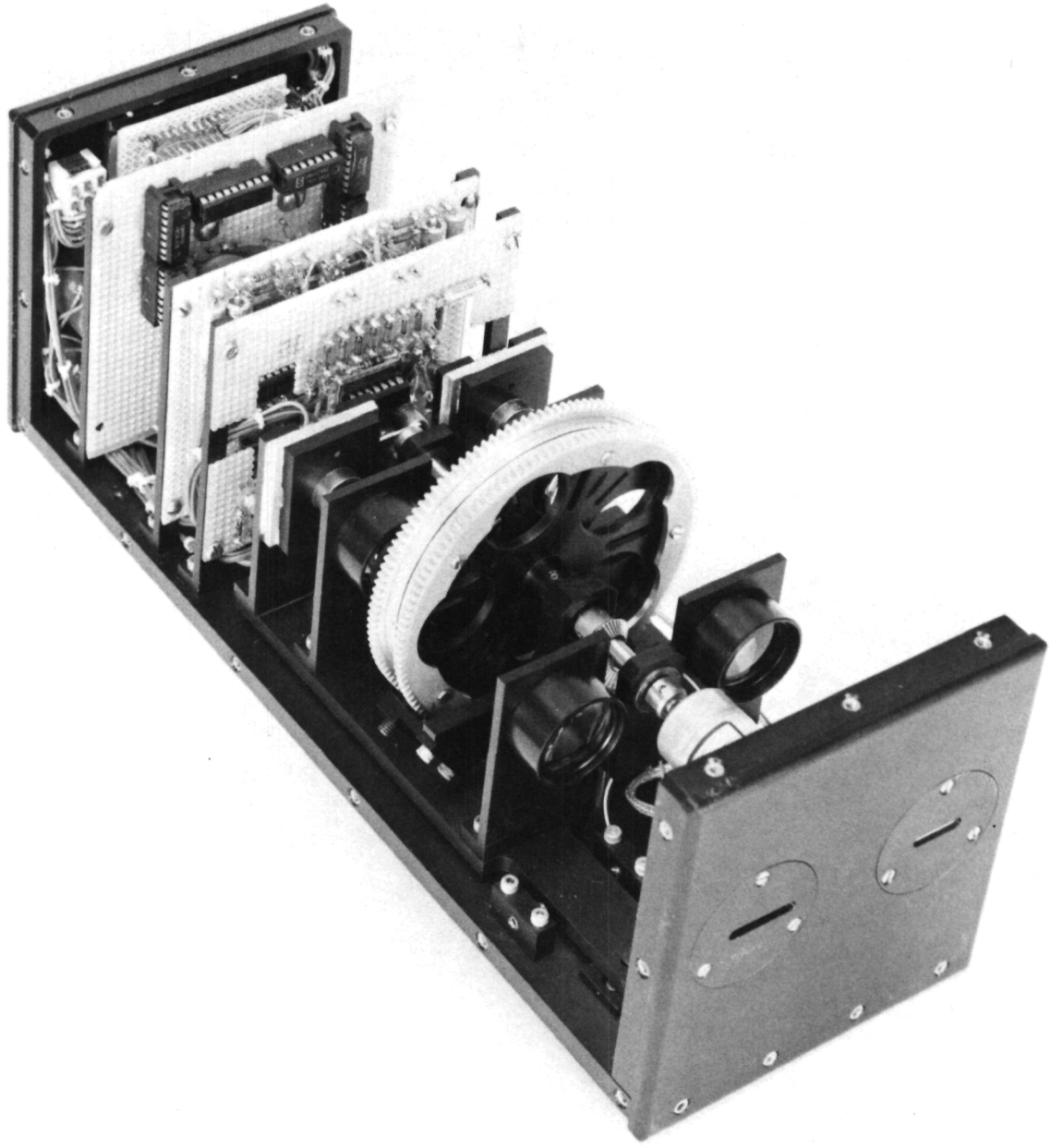
The instrument is called the Hand-Held Ratioing Radiometer (HHRR), and as its name implies is a self-contained, dual-beam, ratioing radiometer with digital readout. HHRR contains two optical trains, each containing two repeater lenses and a cooled lead-sulfide detector. One of the trains is adjustable so that measurements can be made from distances of one meter to infinity. The optical trains are intersected by set of two coaxially mounted filter wheels, each containing up to five interference filters. Filters with band passes as narrow as 0.01 micrometers can be used in the region 0.4 - 2.5 μm.

The development of HHRR was based on results obtained from the JPL Portable Field Reflectance Spectrometer that has yielded thousands of *in situ* reflectance spectra in the 0.4- to 2.5-μm region. Clays and carbonates, for example, have unique spectral properties in the 2- to 2.5-μm region. By using properly chosen spectral filters, and ratioing the signals to remove the effect of topography on the brightness measured, a number of materials can be identified uniquely. For instance, montmorillonite and kaolinite yield very different ratio values for filters centered at 2.10 and 2.17 μm. Therefore, for a number of materials, HHRR can be used as an analytical tool in the field. This can replace the normal procedure of returning samples to the laboratory for X-ray analysis, a procedure which is both expensive and time-consuming.

The instrument can be used on the ground or from a moving vehicle or aircraft. Caltech has applied for a patent, and Barringer Research Inc. of Denver, Colorado has taken a license to manufacture the instrument.



The Hand-Held Ratioing Radiometer being used in the field.



Closeup view of the Hand-Held Ratioing Radiometer with cover off.